GUJARAT TECHNOLOGICAL UNIVERSITY BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2160602 Subject Name: Applied Fluid Mechanics Time: 10:30 AM to 01:00 PM Instructions:

Total Marks: 70

Date: 24/10/2016

- 1. Attempt all questions.
 - 2. Make suitable assumptions wherever necessary.
 - 3. Figures to the right indicate full marks.
- Q.1 (a) Derive the equation for calculating loss of head due to sudden enlargement. 07
 - (b) Prove that Maximum Velocity is equal to one and half times the average 07 velocity for flow between fixed parallel plate.
- Q.2 (a) Derive "Darcy Weisbach" formula for the loss of head due to friction in pipe 07 line.
 - (b) A horizontal pipe of 150 mm diameter is suddenly enlarged to 300 mm diameter. The rate of flow of water through a pipe is 0.2 m³/sec. The pressure intensity of smaller pipe 125 kPa. Determine (i) Loss of head due to sudden enlargement (ii) Pressure intensity in large pipe.

OR

- (b) A pipe of diameter of 20 cm conveying water. Calculate the discharge when centre line velocity is 3 m/sec and velocity at a point 4 cm from centre is 2.5 m/sec.
- Q.3 (a) What is displacement Thickness? Derive the expression for displacement 07 thickness of boundary layer flow.
 - (b) If velocity distribution in laminar boundary layer over a flate plate is assumed to be given by second order polynomial $u = a + by+cy^2$, determine its form using the necessary boundary condition. 07

OR

- Q.3 (a) The efficiency (η) of fan depends on density (ρ), dynamic viscosity (μ), angular velocity (ω), diameter (D) & discharge (Q). Express efficiency (η) in terms of dimensionless parameter.
 - (b) What is afflux? Derive the expression for length of Back water curve. 07
- Q.4 (a) Prove that for trapezoidal channel of most economical section half of top width 07 is equal to length of one of the sloping side.
 - (b) Find out bed slope of trapezoidal channel of bed width 4 m, depth of water 3m and side slope of 2 horizontal to 3 vertical. When discharge through channel is 20 m^3 /sec. Take Manning's Constant N = 0.03.

OR

- Q.4 (a) Define: Critical flow, Critical depth, Alternate depth, Subcritical flow. Draw the 07 specific energy curve for constant discharge in an open channel.
 - (b) A circular channel of 2 m diameter carries water at a depth of 0.8 m. If the bed slope of the channel is 1500. Find the discharge through the channel. Take chezy's constant C= 50.
- **Q.5** (a) Compare Impulse turbine and Reaction Turbine.

	(b)	Explain construction and working of a pelton wheel.	07
		OR	
Q.5	(a)	Define: Volumetric efficiency, mechanical efficiency, hydraulic efficiency,	07
		Overall Efficiency.	
	(b)	Explain the Buckingham's π - theorem for dimensional analysis.	07
